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(54) Blower

(57) In the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, characterized that the rib is formed upper side of the inner side of the foregoing casing, otherwise; the rib is formed so that it has a plurality of the bosses extruding out of the lower side, the plain view of the foregoing rib is plural, and cylindrical shape with a center of the foregoing rotary axis whereby the air turbulence never occurs, never great load when the fan turns, and the efficiency of blower improves.

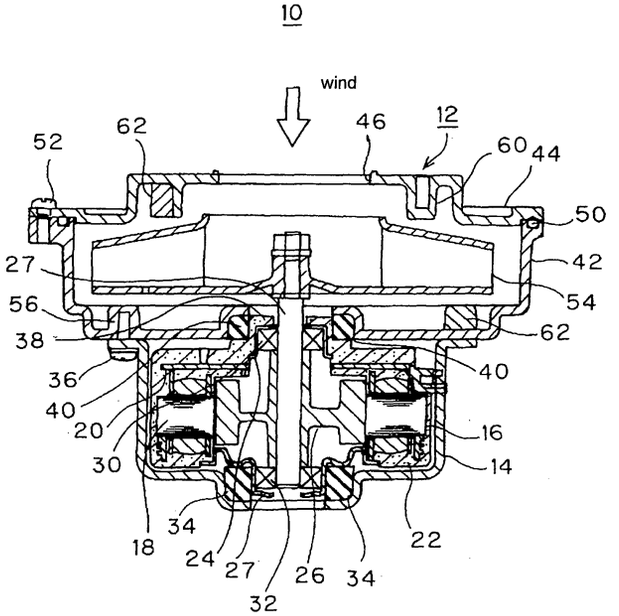

Fig. 1

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Description

Field of the invention

[0001] This invention concerns to the blower such as turbo-fan device and sirocco fan device.

Background of the invention

[0002] The turbo-fan device and the sirocco fan device have been used for blower for burning gas in boiler (Ref. Conventional blower shown as below).

[0003] There is shown a blower 100 as in fig. 12 to fig. 14.

[0004] This blower 100 consists of the casing 102 being composed of the circular casing lid 118 and the casing main 120, and the molded motor 104 which is fixed on the bottom side of the casing 102. The inlet 106 is opened at the upper side of the casing 102, the outlet 108 is opened on the outer circumference, and the fan 110 is prepared inside. This fan 110 is connected the rotary axis 112, and if the molded motor 104 rotates, then the fan 110 also rotates, and the air sucked axially through the inlet 106 blows out of the outlet 108.

[0005] In this kind of blower 100, a plurality of bosses 114 are extruded by embossing at the bottom of internal side in order to fix the molded motor 104 with the bottom of casing 102. Furthermore, at the top of internal side of the casing, there are also prepared the bosses 116 so as to install on the boiler.

[0006] As explained above, the bosses 114, 116 cause the turbulence in the casing 102 when the fan 110 is turned on whereby this turbulence causes resistance and load on the blower 100.

[0007] Since the structure is to directly set the molded motor 104 with the casing 102, if the balance of combination is not good, oscillation by rotation of molded motor 104 causes bigger oscillation which is caused in order of oscillation of molded motor 104 and casing 102. Furthermore, oscillation of the casing 102 transmits the boiler whereby the boiler oscillates itself.

[0008] This invention presents the blower whereby turbulence caused by bosses is held down, improves the efficiency of the blower, and oscillation from motor is not transmitted to casing.

Disclosure of the invention

[0009] According to the claim 1, in the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, characterized that the rib is formed upper side of the inner side of the foregoing casing, otherwise; the rib is formed so that it has a plurality of the bosses extruding out of the lower side, the plain view of the foregoing rib is cylindrical shape with a center of the foregoing rotary axis.

[0010] According to the claim 2, in the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, characterized that the rib is formed upper side of the inner side of the foregoing casing, otherwise; the rib is formed so that it has a plurality of the bosses extruding out of the lower side, the plain view of the foregoing rib is plural, and cylindrical shape with a center of the foregoing rotary axis.

[0011] According to the claim 3, in the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, characterized that the casing lid is prepared so as to cover a plurality of bosses extruding the bottom or upper side of the inner side of the foregoing casing.

[0012] According to the claim 4, in the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, characterized that the external shape of the plural bosses extruding from the upper side or bottom side in the casing is streamlined along with the flow of the air.

[0013] According to the claim 5, in the blower, the foregoing plural bosses extrude the out of the bottom side of the foregoing casing and screw hole is tapped to fix the foregoing motor with by screw that is characterized in at least one of claim 1 to claim 4.

[0014] According to the claim 6, in the blower, the foregoing plural bosses extrude from the upper side of the foregoing casing and there are screw holes to fix the other member that is characterized in at least one of claim 1 to claim 4.

[0015] According to the claim 7, in the blower, the foregoing motor is built-in the motor frame, the foregoing motor frame is fixed under the foregoing casing, the elastic member is prepared between the foregoing and the motor that is characterized in at least one of claim 1 to claim 4.

[0016] According to the claim 8, in the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforemen-

tioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, characterized that the foregoing motor is built-in the motor frame and there is prepared a elastic member between the foregoing motor frame and the motor.

[0017] According to the claim 9, in the blower, the foregoing motor is molded motor that is characterized in at least one of claim 1 to claim 8.

[0018] According to the claim 10, in the blower, the foregoing motor is brushless DC motor.

Brief description of the drawing

[0019]

Fig.1: Vertical section of the first embodiment of this invention
Fig.2: Bottom view of the casing lid
Fig.3: Plane view of the casing main
Fig.4: Vertical section of the second embodiment of this invention
Fig.5: Bottom view of the casing lid
Fig.6: Plane view of the casing main
Fig.7: Vertical section of the third embodiment of this invention
Fig.8: Plane view of the casing lid
Fig.9: Plane view of the casing main
Fig.10: Vertical section of the fourth embodiment of this invention
Fig.11: Plane view of the casing lid
Fig.12: Vertical section of the conventional example
Fig.13: Bottom view of the casing lid
Fig.14: Plane view of the casing main
10: Blower
12: Casing
14: Motor frame
16: Molded motor
27: Rotary axis
34: Elastic member
36: Screw
40: Elastic member
42: Casing main
44: Casing lid
46: Inlet
48: Outlet
52: Screw
54: Fan
56: Boss underneath (Lower boss)
58: Rib underneath (Lower rib)
60: Upper boss
62: Upper rib
64: Lid plate
66: Lid plate

Detailed description of the invention

[0020] Regarding the blower 10, we are going to explain with fig.1 to fig.3.

1. The first embodiment

(1) Structure of blower 10

[0021] The blower 10 consists of almost cylindrical casing 12, motor frame 14 being fixed to the bottom side of casing 12 and motor 16 accommodated in the motor frame 14.

[0022] Molded motor 16 is 3-phase brushless DC motor. Ring-like stator 18 and ring-like circuit board 20 are formed in one unit with mold resin to make molded motor casing 22. Meanwhile, the output-side bracket 24 is also formed in one unit when they are formed in one unit.

[0023] In the cylindrical space of motor casing 22, rotor 26 with rotary axis 27 is arranged. This rotor 26 is supported by output-side bracket 24 and counter-output-side bracket 28, there is prepared bearing 30 in between output bracket 24 and there is prepared bearing 32 in between output bracket 28.

[0024] This molded motor 16 is accommodated in the cup-like metal molded motor frame 14. There is an elastic member 34 made of tubular cushion between the bottom of molded motor frame 14 and counter-output side bracket 32 in the case of accommodating it.

[0025] The motor frame 14 and the molded motor are fixed underside of the casing 12 with screws 36. In this case, between the projection 38 at the output-side of the molded motor and the outskirt of the penetrating hole at the central part of the casing 12, the elastic member 40 which is ring-like cushion is prepared.

[0026] Casing 12 consists of the casing main 42 and the casing lid 44 which is covered on the casing main 42. In the central portion of the casing lid 44, the inlet 46 is open to suck the air. Around the external side of the casing main 42, there is prepared the outlet 48 as shown in fig.3.

[0027] This casing main 42 and the casing 44 are fixed with screws 52 via O-ring. The fan 54 is accommodated in the casing 12 and connected to the rotary axis 27 of the molded motor 16.

[0028] As shown in fig.3, at the bottom of the casing 12, that is the bottom part of the casing 42, three lower bosses project concentrically with same spaces. These lower bosses 56 have female-screw holes to mesh with the screw 36 and to fix the motor frame 14. In order to include the concentric three pieces of boss underneath 56, the cylindrically-underneath rib 58 extrude the lower side of the casing 12. This cylindrically-underneath rib 58 is formed with the center of the rotary axis 27, furthermore, in order to include three pieces of bosses underneath 56, they are formed in one unit by embossing.

[0029] As shown in fig.2, in the upper side of the casing 12, that is, at the external side of the inlet 46 of the

casing lid 44, eight pieces of the upper bosses 60 extrude with equal distances. In order to include the concentric eight pieces of the upper bosses 60, cylindrical upper rib 62 extrude the casing lid 44. This cylindrical upper rib 62 is formed with a center of the rotary axis. Moreover, eight pieces of the lower bosses 62 are formed in one unit by embossing so as to contain the upper rib.

(2) Motion of blower 10

[0030] When the rotary axis 27 rotates, the fan 54 also turns, and then the air is sucked axially, the air is blown out of the outlet 48 being prepared on the external surface.

[0031] In this case, even if the molded motor 16 turns and oscillates, the transmission of oscillation is prevented by the elastic member 34 and the transmission of oscillation is prevented by the elastic member 40 so oscillations of the molded motor 16 is not transmitted to casing 12, that is to say, it is possible to hold down the oscillation and noise of the casing 12. Meanwhile, by insulating the oscillation between molded motor 16 and casing 12, it becomes possible to have some remains for the fan 110 or molded motor 16, namely the balancing process is eliminated and cost down is expected.

[0032] Even if the fan 54 turns and the air is blown in the casing 12, since the lower bosses 56 are included in the lower rib 58, the turbulence is not caused by the lower bosses. In the meantime, since the upper bosses 60 of the casing 12 are included in the upper rib 62, the turbulence is not caused. Therefore, the fan 54 is not loaded when it turns and the efficiency of the blower 10 is expected to be improved.

2. The second embodiment

[0033] Regarding the blower 10, we are going to explain with fig.4 to fig.6.

[0034] The first and the second embodiment differ as below.

[0035] The first difference is that the motor casing 22 of the molded motor 16 is directly fixed on the bottom of the casing 12.

[0036] The second difference is the shape of the cylindrical lower rib 58 and upper rib 62. Like the first embodiment, if the lower rib 58 contains the lower boss 56, the thickness of the lower rib 58 becomes thick and at the stage of embossing, there is an anxiety of shrinkage cavity at embossing as well as the upper rib 62.

[0037] Whereas, in this embodiment, the lower rib 58 and the upper rib 62 make dual structure, and a plurality of cylindrical and concentric lower rib 58a, 58b and the upper rib 62a, 62b constructs the foregoing structure whereby cylindrical rib becomes thin and then the shrinkage cavity is gone.

[0038] Even if there are dual cylindrical lower ribs 58, 62, there is no air turbulence caused by rotation of fan 54.

[0039] This cylindrical rib is not restricted in the dual structure, that is, more than triple is possible on the condition that they are concentric not to cause air turbulence.

3. The third embodiment

[0040] Regarding the blower 10, we are going to explain with fig.7 to fig.9.

[0041] Difference between the second embodiment and this embodiment is in the preventive structure to the turbulence.

[0042] As shown in fig.7, in this embodiment, there is ring-like lid plate 64 so as to cover the three lower bosses 56. Meanwhile, regarding eight upper bosses 60 being on the casing 12, ring-like lid plate 66 covers these.

[0043] Thereby, in the rotary chamber 13, wherein the fan 54 rotates, is formed the bottom plate with the lid plate 64, and the upper side is formed with the lid plate 66. Therefore, the lower bosses 56 and the upper bosses 60 don't jut out but even, whereby the air turbulence caused by the fan doesn't occur.

4. The fourth embodiment

[0044] Regarding the blower 10, we are going to explain with fig.10 to fig.11.

[0045] Difference between the second embodiment and this embodiment is in the preventive structure to the turbulence caused by the lower bosses 56 and the upper bosses 60.

[0046] In this embodiment, as shown in fig.11, eight upper bosses 60 are formed so that the shape is streamlined. This streamlined shape follows the flow raised by rotation of the fan 54.

[0047] Therefore, it doesn't make the air turbulence and nothing is loaded on the fan 54.

[0048] This invention can be altered variously without limitation to the aforementioned embodiments.

Claims

1. In the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, **characterized** that the rib is formed upper side of the inner side of the foregoing casing, otherwise; the rib is formed so that it has a plurality of the bosses extruding out of the lower side, the plain view of the foregoing rib is cylindrical shape with a center of the foregoing rotary axis.

2. In the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, **characterized** that the rib is formed upper side of the inner side of the foregoing casing, otherwise; the rib is formed so that it has a plurality of the bosses extruding out of the lower side, the plain view of the foregoing rib is plural, and cylindrical shape with a center of the foregoing rotary axis.

3. In the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, **characterized** that the casing lid is prepared so as to cover a plurality of bosses extruding the bottom or upper side of the inner side of the foregoing casing.

4. In the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, **characterized** that the external shape of the plural bosses extruding from the upper side or bottom side in the casing is streamlined along with the flow of the air.

5. In the blower, the foregoing plural bosses extrude the out of the bottom side of the foregoing casing and screw hole is tapped to fix the foregoing motor with by screw that is **characterized in** at least one of claim 1 to claim 4.

6. In the blower, the foregoing plural bosses extrude from the upper side of the foregoing casing and there are screw holes to fix the other member that is **characterized in** at least one of claim 1 to claim 4.

7. In the blower, the foregoing motor is built-in the motor frame, the foregoing motor frame is fixed under the foregoing casing, the elastic member is prepared between the foregoing and the motor that is **characterized in** at least one of claim 1 to claim 4.

8. In the blower, the fan being connected with the axis of motor being arranged inside the casing, the inlet being opened at upper side of the casing, the outlet being opened roundly, the foregoing motor being set under the bottom of the aforementioned casing, the foregoing fan being rotated by the foregoing motor, the foregoing inlet sucking air to the direction of the axis, the air blowing out from the outlet prepared roundly, **characterized** that the foregoing motor is built-in the motor frame and there is prepared a elastic member between the foregoing motor frame and the motor.

9. In the blower, the foregoing motor is molded motor that is **characterized in** at least one of claim 1 to claim 8.

10. In the blower, the foregoing motor is brushless DC motor.

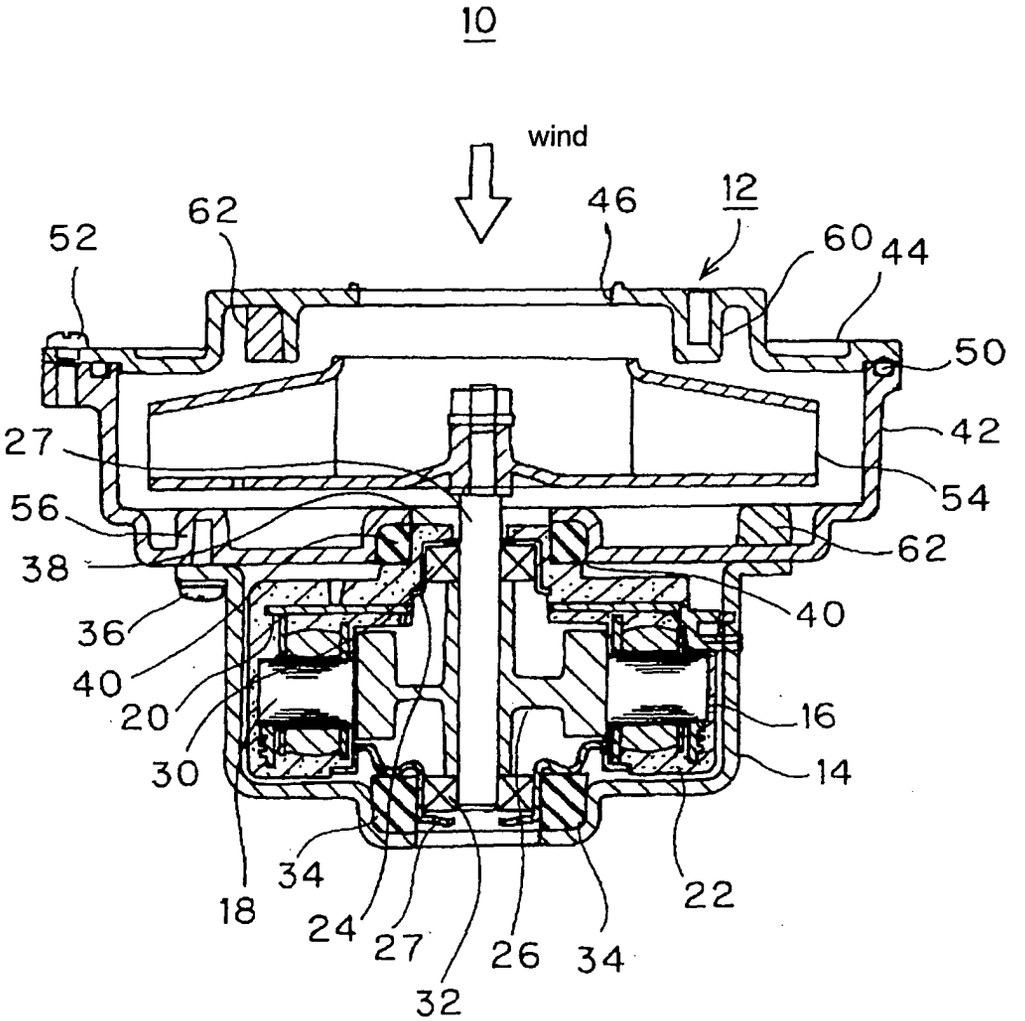
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Fig. 1

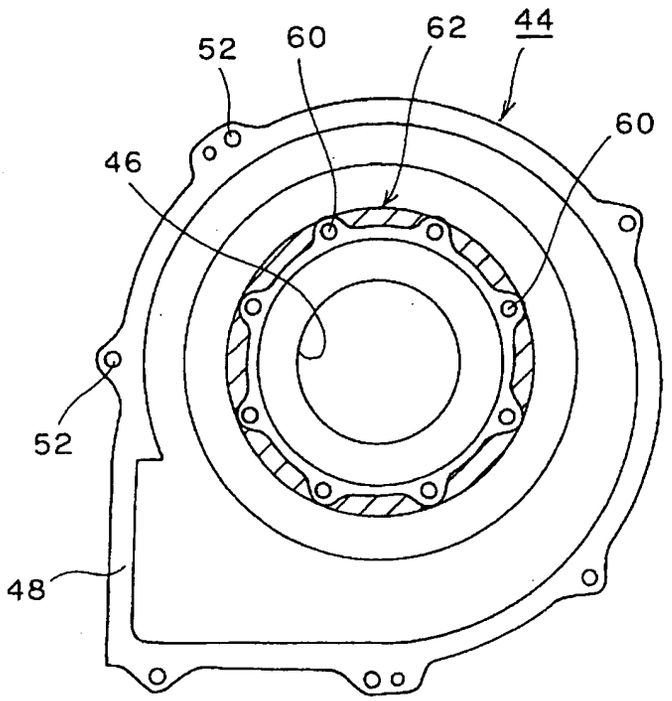

Fig. 2

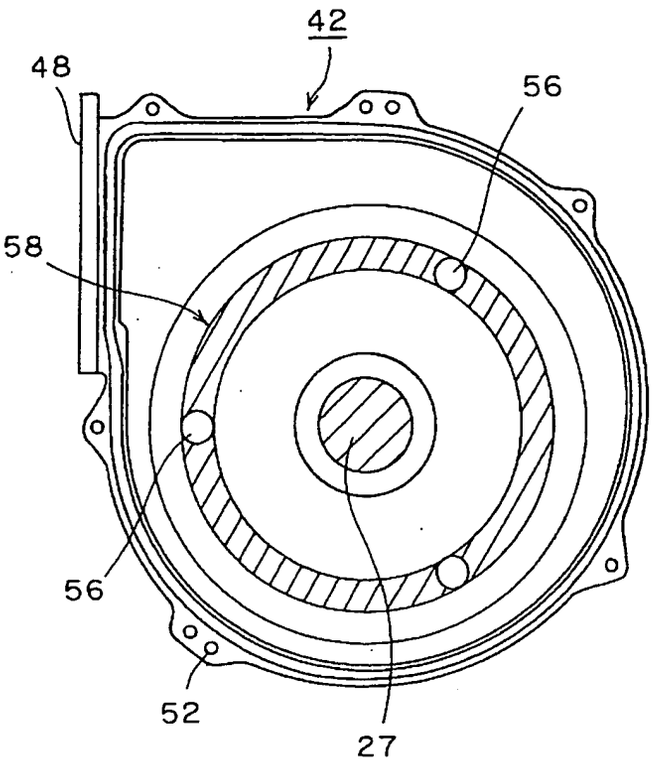

Fig. 3

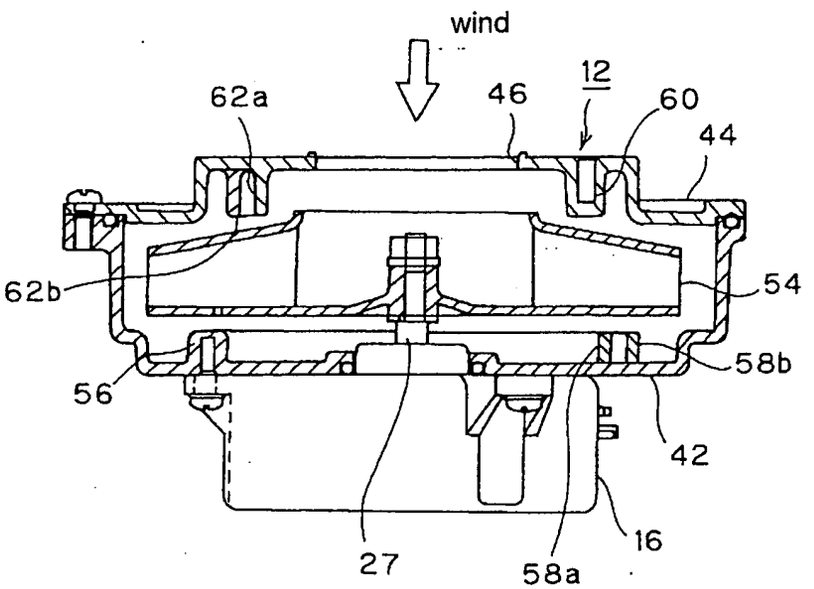

Fig. 4

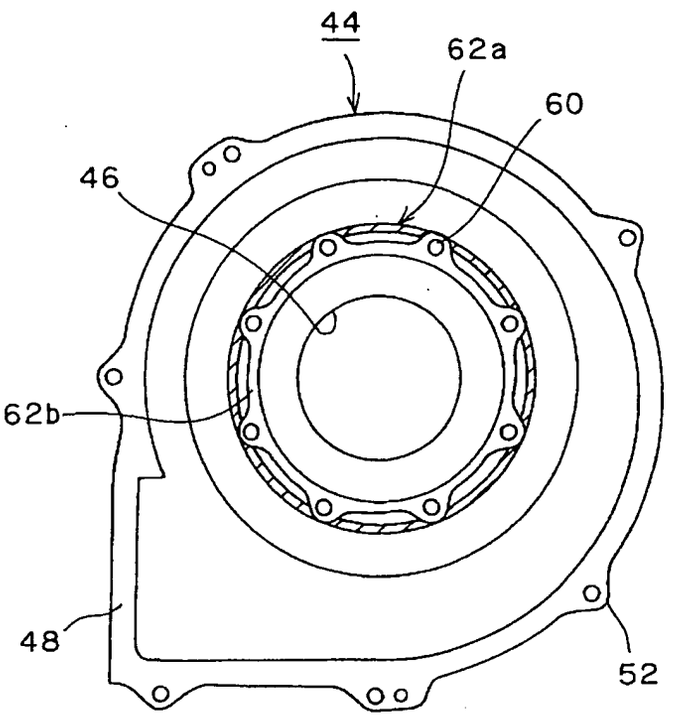

Fig. 5

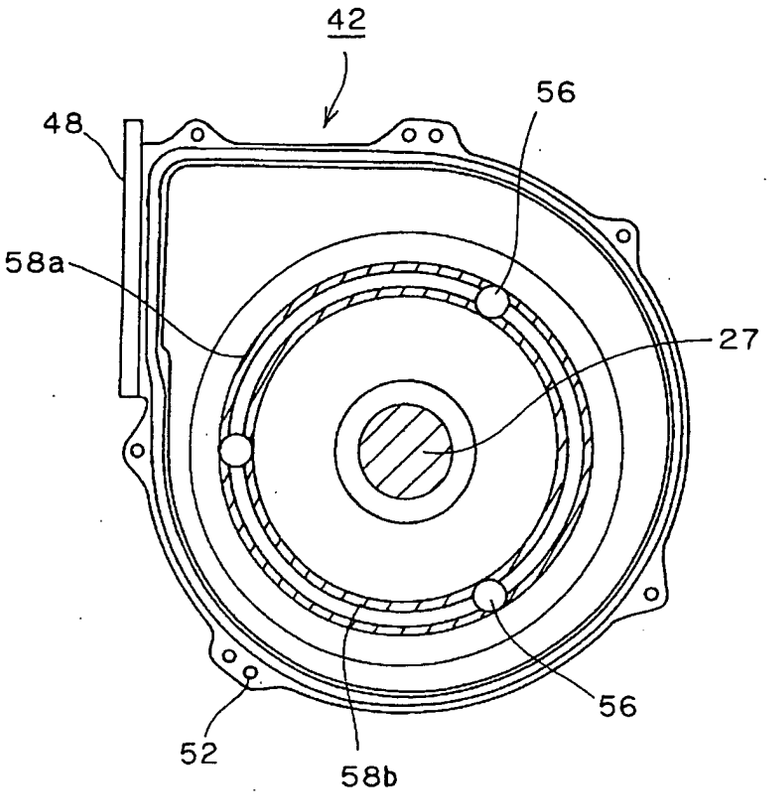

Fig. 6

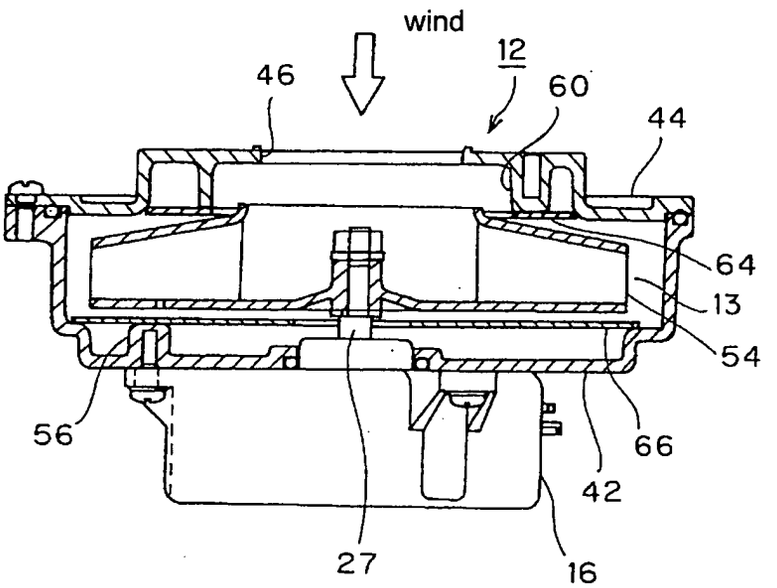

Fig. 7

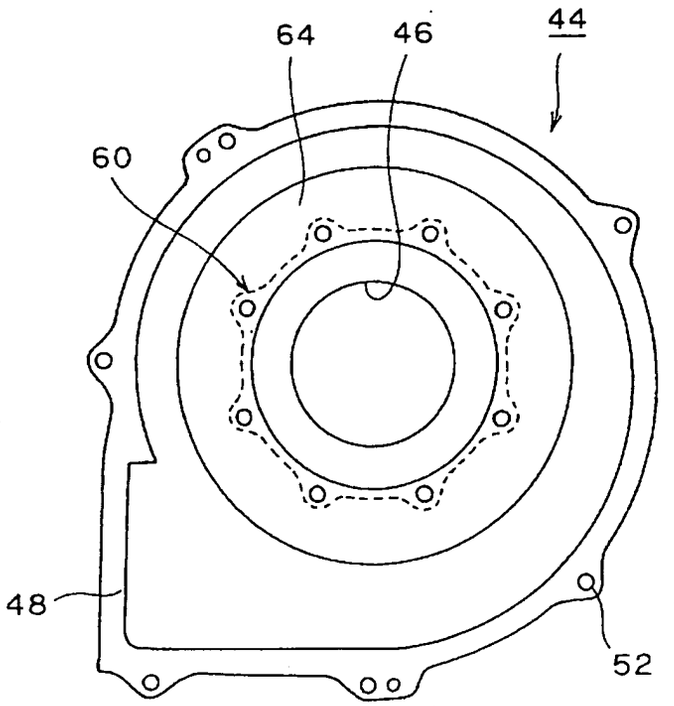

Fig. 8

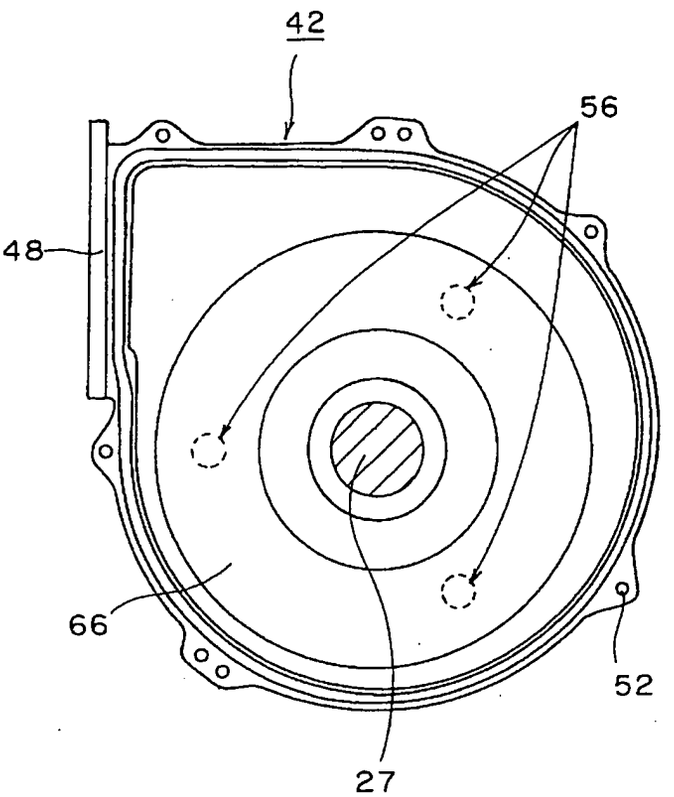

Fig. 9

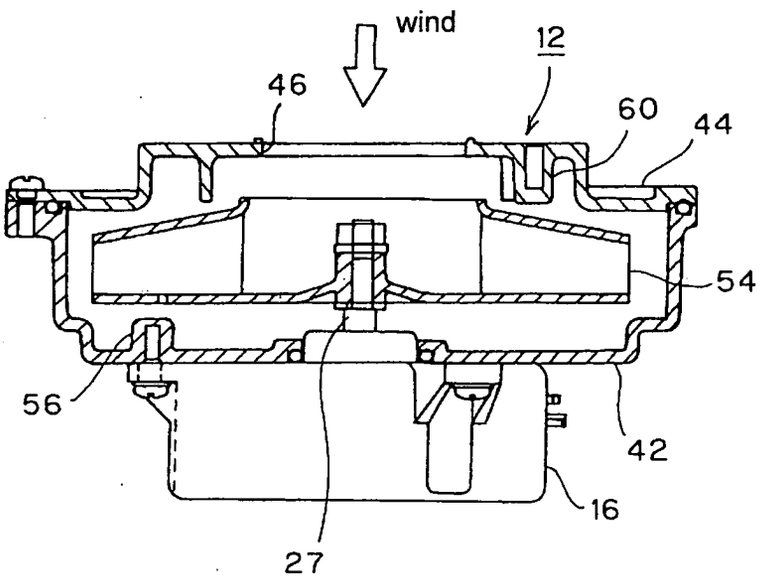

Fig. 10

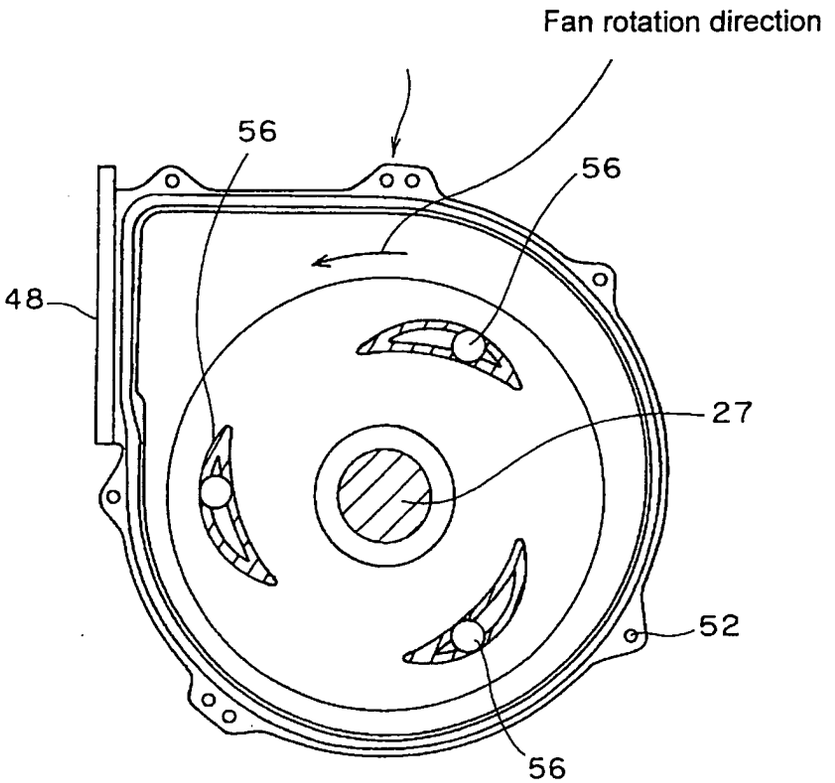

Fig. 11

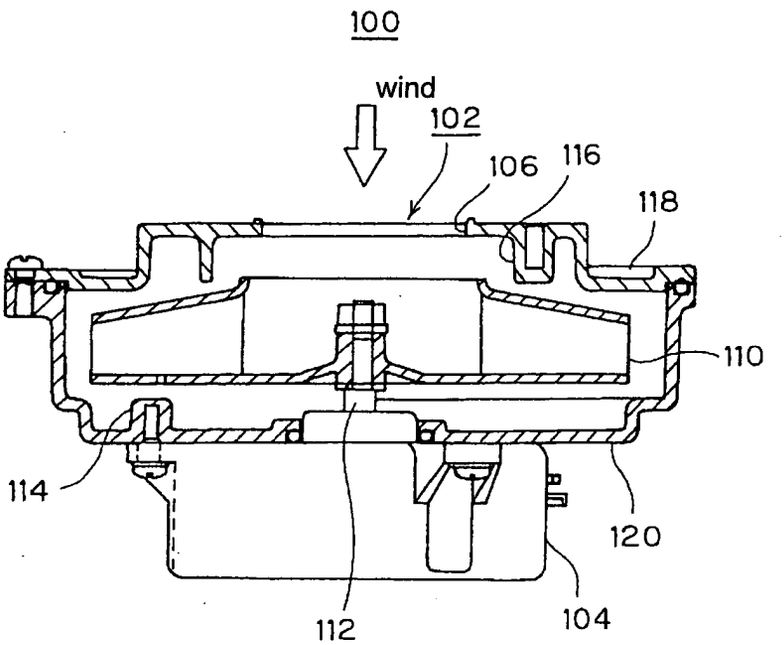

Fig. 12

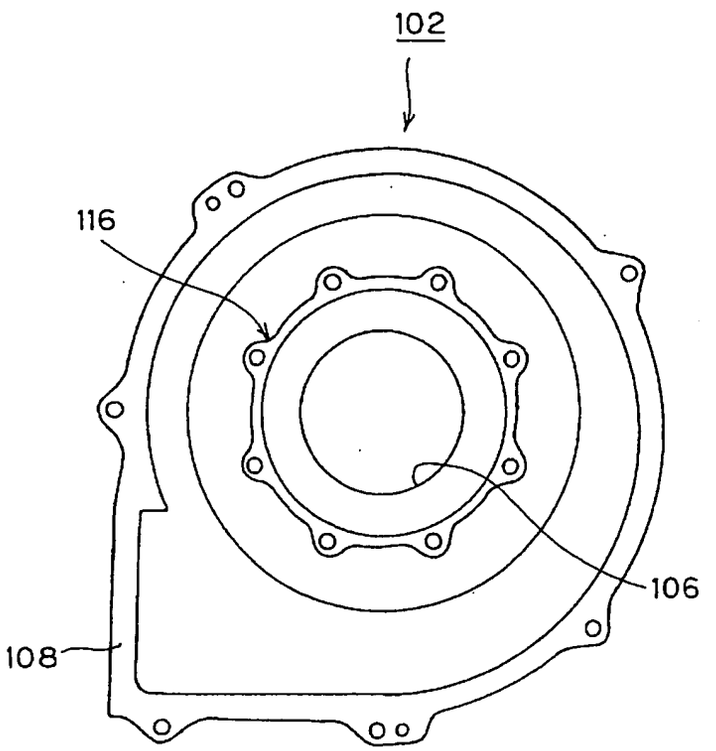

Fig. 13

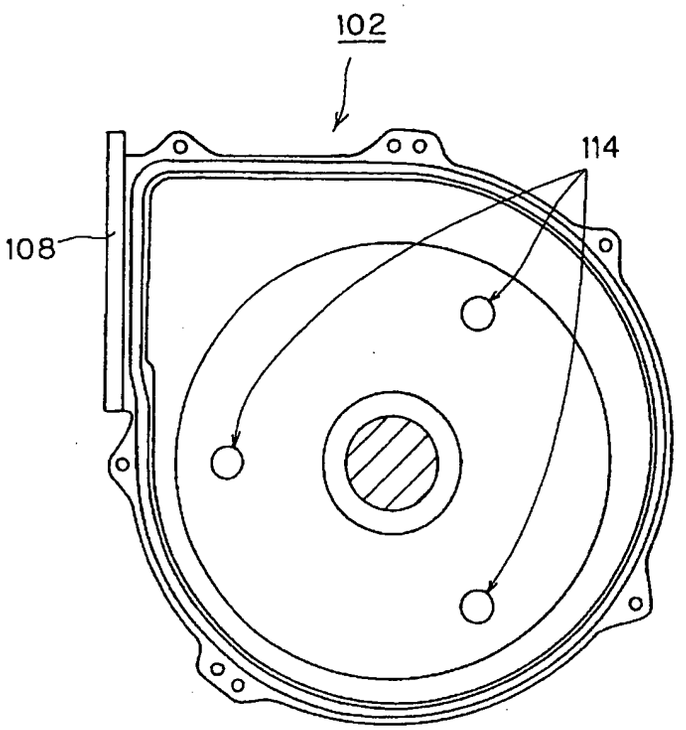

Fig. 14

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 00 9373

DOCUMENTS CONSIDERED TO BE RELEVANT

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

F04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 August 2005	Giorgini, G

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 00 9373

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-08-2005

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